

We claim:

1. A system for the controlled release or exposure of reservoir contents comprising:
 - a microchip device comprising a substrate having a plurality of reservoirs containing reservoir contents for release or exposure; and
 - a rechargeable or on-demand power source comprising a local component which can wirelessly receive power from a remote transmitter,
 - wherein the received power can be used, directly or following transduction, to activate said release or exposure of the reservoir contents.
2. The system of claim 1, wherein the remote transmitter transmits electromagnetic energy or mechanical energy.
3. The system of claim 2, wherein the electromagnetic energy is selected from the group consisting of radio frequency signals, microwave signals, infrared light, visible light, and ultraviolet light.
4. The system of claim 2, wherein the mechanical energy comprises acoustic energy.
5. The system of claim 1, wherein the power source comprises a rechargeable power storage unit.
6. The system of claim 5, wherein the rechargeable power storage unit comprises a capacitor or a rechargeable battery.
7. The system of claim 5, wherein the rechargeable power storage unit further comprises a coil for the receipt of electromagnetic energy, a photocell, a hydrophone, or a combination thereof.

8. The system of claim 1, wherein the power source comprises an on-demand power unit.

9. The system of claim 1, wherein the power source comprises both an on-demand power unit and a rechargeable power storage unit.

10. The system of claim 1, further comprising actuation electronics to selectively control and direct the power to selectively open the reservoirs.

11. The system of claim 10, wherein the actuation electronics comprises components selected from the group consisting of multiplexers, demultiplexers, signal generators, signal oscillators, amplifiers, switches, potentiostats, and combinations thereof.

12. The system of claim 1, further comprising a local controller for controlling the actuation electronics.

13. The system of claim 12, wherein the local controller comprises components selected from the group consisting of microprocessors, read only memory, random access memory, clocks, analog input/output devices, digital input/output devices, programmable logic circuits, and combinations thereof.

14. The system of claim 13, wherein the local controller or a component thereof receives signals from a biosensor.

15. The system of claim 1, further comprising a telemetry system for the wireless transfer of data between the microchip device and a remote controller.

16. The system of claim 15, wherein the data transfer is accomplished via a first coil hardwired to the microchip device to inductively couple electromagnetic energy to a corresponding coil in the remote controller.

17. The system of claim 15, wherein the microchip device comprises a receiver comprising a component selected from the group consisting of photocells, photodiodes, phototransistors, and ultrasonic receivers.

18. The system of claim 15, wherein the remote controller comprises a light-emitting diode, a laser, or an ultrasonic transmitter.

19. The system of claim 1, further comprising:
actuation electronics to selectively control and direct the power to selectively open the reservoirs;
a local controller for controlling the actuation electronics; and
a telemetry system for the wireless transfer of data between the microchip device and a remote controller.

20. The system of claim 1, wherein the reservoir contents comprise a drug, a sensor, or a combination thereof.

21. The system of claim 1, wherein each reservoir has a reservoir cap positioned on the reservoir over the reservoir contents, and wherein release or exposure of the reservoir contents is controlled by diffusion through or disintegration of the reservoir cap.

22. The system of claim 21, wherein the microchip device further comprises a cathode, wherein at least one reservoir cap is an anode, and the power is used to apply an electric potential between the cathode and anode to oxidize the reservoir cap and expose the reservoir contents to a surrounding fluid.

23. A microchip device for the controlled release or exposure of reservoir contents in a human or animal comprising:

- a substrate having a plurality of reservoirs containing reservoir contents for release or exposure; and
- a component which converts mechanical or chemical energy from the body of the human or animal into power which can be used to activate said release or exposure of the reservoir contents.

24. The microchip device of claim 23, wherein the component transduces a mechanical force produced by motion of the body or a part thereof into the power.

25. The microchip device of claim 23, wherein the component comprises a biofuel cell which generates the power by chemically reacting a molecule present in the body.

26. A system for the controlled release or exposure of reservoir contents comprising:

- a microchip device comprising a substrate a plurality of reservoirs containing reservoir contents for release or exposure; and
- a telemetry system for the wireless transfer of data between the microchip device and a remote controller.

27. The system of claim 26, further comprising actuation electronics to selectively open the reservoirs.

28. The system of claim 27, wherein the actuation electronics comprises components selected from the group consisting of multiplexers, demultiplexers, signal generators, signal oscillators, amplifiers, switches, potentiostats, and combinations thereof.

29. The system of claim 28, further comprising a local controller for controlling the actuation electronics.

30. The system of claim 29, wherein the local controller comprises components selected from the group consisting of microprocessors, read only memory, random access memory, clocks, analog input/output devices, digital input/output devices, programmable logic circuits, and combinations thereof.

31. The system of claim 30, wherein the local controller can wirelessly communicate with the remote controller of the telemetry system.

32. The system of claim 31, wherein the data transfer is accomplished using a first coil in the microchip device to inductively couple electromagnetic energy to a corresponding coil in the remote controller.

33. The system of claim 26, wherein the microchip device comprises a receiver which comprises a component selected from the group consisting of photocells, photodiodes, phototransistors, and ultrasonic receivers.

34. The system of claim 26, wherein the remote controller comprises a light-emitting diode, a laser, or an ultrasonic transmitter.

35. The system of claim 26, wherein the reservoir contents comprise a drug, a sensor, or a combination thereof.

36. The system of claim 26, wherein each reservoir has a reservoir cap positioned on the reservoir over the reservoir contents, and wherein release or exposure of the reservoir contents is controlled by diffusion through or disintegration of the reservoir cap.

37. The system of claim 36, wherein the microchip device further comprises a cathode, wherein at least one reservoir cap is an anode, and an electric potential is applied between the cathode and anode to oxidize the reservoir cap and expose the reservoir contents to a surrounding fluid.

38. The system of claim 35, wherein the microchip device is adapted for implantation onto or in the eye of a human or animal, and wherein the remote controller comprises an ophthalmic laser.

39. The system of claim 35, wherein the microchip device is adapted for administration *in vivo*, and wherein the remote controller comprises a radio frequency transmitter.

40. The system of claim 26, wherein the reservoir contents comprise a sensor for detecting a chemical or biological molecule, and wherein the telemetry system transmits a status of said detecting from the sensor to the remote controller.

41. The system of claim 40, wherein the chemical or biological molecule is associated with a chemical or biological weapon.

42. The system of claim 41, wherein the reservoir contents further comprises an antidote for the chemical or biological molecule.

43. The system of claim 26, further comprising a rechargeable or on-demand power source which comprises a local component which can wirelessly receive power from a remote transmitter.

44. A method of releasing or exposing the reservoir contents of a microchip device at a site, the method comprising:

providing the microchip device of claim 1 at a first site;

providing a remote transmitter at a second site distal from the first site; and

wirelessly transmitting power from the remote transmitter to the microchip device in an amount effect to activate release or exposure of the reservoir contents.

45. The method of claim 44, wherein the first site is *in vivo* in a human or animal, and wherein the second site is *ex vivo*.

46. The method of claim 44, wherein the reservoir content comprises a drug, a sensor, or a combination thereof.

47. A method of releasing or exposing the reservoir contents of a microchip device at a site, the method comprising:

providing the microchip device of claim 26 at a first site;

providing a remote transmitter at a second site distal from the first site; and

wirelessly transferring data between the microchip device and a remote controller.

48. The method of claim 47, wherein the first site is *in vivo* in a human or animal, and wherein the second site is *ex vivo*.

49. The method of claim 48, wherein the reservoir contents comprise a therapeutic, prophylactic, or diagnostic agent.

50. The method of claim 47, wherein both the first site and the second site are *ex vivo*.